

What is claimed is:

1. A system for analyzing hearing-related function in humans comprising:

- a host processor having first and second personal computer memory card international association (PCMCIA) defined ports, said host processor including a memory system to store hearing aid programming instructions and hearing analysis instructions;
- a first PCMCIA Card coupled to said first PCMCIA defined port, said first PCMCIA Card including first circuits interacting with said host processor to download said hearing aid programming instructions, and further including a first processor system coupled to said first circuits to execute said hearing aid programming instructions;
- a second PCMCIA Card coupled to said second PCMCIA defined port, said second PCMCIA Card including second circuits interactive with said host processor to download said hearing-related analyzing instructions, and further including a second processor system coupled to said second circuits to execute said hearing-related analyzing instructions.

2. A system as in claim 1, wherein said first PCMCIA Card further includes a first output circuit coupled to said first

processor system to provide selected hearing aid program signals to one or more hearing aids to be programmed.

3. A system as in claim 2, wherein said second PCMCIA Card further includes:

a plurality of selectable audio signal sources;

first control circuits coupled to said plurality of selectable audio signal sources and coupled to said second processor system to select one of said plurality of selectable audio signal sources in response to predetermined ones of said hearing-related analyzing instructions; and

a second output circuit coupled to said second processor system, to said first control circuits, and to said plurality of selectable audio signal sources to provide selected audio signals.

4. A system as in claim 3, and further including in combination:

an audio signal device coupled to said second output circuit to apply said selected audio signals to a person whose hearing is to be tested.

5. A system as in claim 4, wherein said second PCMCIA Card further includes:

a feedback circuit having an input section to receive feedback signals and an output section; and  
a feedback control circuit coupled to said output section and coupled to said second processor system to control transmission of said feedback signals to said host processor.

6. A system as in claim 5, and further including in combination:

a feedback device coupled to said input section, said feedback device including selection devices operable to feedback hearing analysis signals indicative of hearing responses resulting from the selected ones of said selected audio signals.

7. For use with a host processor having at least one personal computer memory card international association (PCMCIA) defined port and a memory system, a hearing analyzing system comprising:

PCMCIA interface means for coupling to the PCMCIA defined port;

processor means coupled to said PCMCIA interface means for providing control signals and for receiving feedback signals; and

audiometer means coupled to said processor means for providing selected output signals to a patient in

response to said control signals and for providing said feedback signals in response to patient feedback.

8. A hearing analyzing system as in Claim 7, wherein said PCMCIA interface means, said processor means, and said audiometer means are mounted on a Card structure selected from Card Types that can be utilized with the PCMCIA defined port.

9. A hearing analyzing system as in Claim 8, wherein said PCMCIA interface means includes Card information structure (CIS) means for providing predetermined Card identification signals to the host processor.

10. A hearing analyzing system as in Claim 9, wherein said processor means includes memory system means for storing said control signals and for storing hearing analyzing program instructions to be used to perform selected hearing analyzing functions.

11. A hearing analyzing system as in Claim 10, wherein said audiometer means includes:

stimulus means coupled to said processor means for providing selected hearing stimulus signals in response to said control signals;

output means for providing said selected hearing stimulus signals to a patient; and

feedback means for providing feedback signals indicative of hearing response of the patient to said selected hearing stimulus signals.

12. A hearing analyzing system as in Claim 11, wherein said stimulus means includes:

audio signal means for providing selectable audio signals;

tone signal means for providing selectable tone signals;

audio control means for selecting the desired ones of said selectable audio signals;

tone control means for selecting the desired ones of said selectable tone signals; and

stimulus control means for shaping and attenuating the selected ones of said audio signals and said tone signals in response to ones of said control signals provided by said processor means and for providing selection of said output means.

13. A hearing analyzing system as in Claim 12, wherein said output means includes transducer means externally coupled to said stimulus control means for providing said selected hearing stimulus signals.

14. For use with a host processor having at least one personal computer memory card international association

(PCMCIA) defined port and a memory system, a hearing analyzing PCMCIA Card comprising:

PCMCIA interface means for coupling to the PCMCIA defined port, said PCMCIA interface means including Card information structure (CIS) means for providing predetermined Card identification signals to the host processor;

control means coupled to said CIS means for providing control signals and for processing feedback signals; and

audiometer means coupled to said control means for providing selected output signals and for providing said feedback signals in response to patient feedback resulting from said selected output signals.

15. For use with a host processor having at least one personal computer memory card international association (PCMCIA) defined port and a memory system, a hearing-related analyzing PCMCIA Card comprising:

PCMCIA interface means for coupling to the PCMCIA defined port, said PCMCIA interface means including Card information structure (CIS) means for providing predetermined Card identification signals to the host processor;

control means coupled to said CIS means for providing control signals and for processing feedback signals; and

real-ear means coupled to said control means for providing selected output signals and for receiving said feedback signals from a patient's ear and providing said feedback signals to said control means.

16. For use with a host processor having at least one personal computer memory card international association (PCMCIA) defined port and a memory system, a hearing-related analyzing PCMCIA Card comprising:

PCMCIA interface means for coupling to the PCMCIA defined port, said PCMCIA interface means including Card information structure (CIS) means for providing predetermined Card identification signals to the host processor;

control means coupled to said CIS means for providing first and second selection signals, control signals, and for processing feedback signals;

audiometer means coupled to said control means and responsive to said first selection signals for providing first selected output signals and for providing first feedback signals to said control means in response to patient feedback resulting from said first selected output signals; and

real ear means coupled to said control means and responsive to said second selection signals for providing second selected output signals and for receiving second feedback signals from a patient's ear and providing said second feedback signals to said control means.

17. For use with a host processor having at least one personal computer memory card international association (PCMCIA) defined port and a memory system, a hearing-related analyzing system comprising:

PCMCIA interface means for coupling to the PCMCIA defined port;

processor means coupled to said PCMCIA interface means for providing control signals and for processing feedback signals from a patient's monitored ear; and real ear means coupled to said processor means for providing selected output signals in response to ones of said control signals and receiving said feedback signals from said patient's monitored ear and for providing said feedback signals to said processor means in response to others of said control signals.

18. A hearing-related analyzing system as in Claim 17, wherein said real-ear means includes output control means responsively coupled to said processor means for controlling



output of said selected output signals, and further including speaker means for providing said selected output signals to the patient.

19. A hearing-related analyzing system as in Claim 18, and further including probe microphone means coupled to said processor means for providing said feedback signals for use in providing signal analysis of said feedback signals.

20. A hearing-related analyzing system as in Claim 17, wherein said PCMCIA interface means, said processor means, and said real ear means are mounted on a Card structure selected from Card types that can be utilized with the PCMCIA defined port.

21. A system for analyzing hearing-related functions in humans comprising:

- a host processor having at least one computer memory card international association (PCMCIA) defined port, said host processor including a memory system to store hearing analyzing programs and to store hearing parameters for a patient;

- a PCMCIA Card coupled to said PCMCIA defined port, said PCMCIA Card including a PCMCIA interface circuit, a control processor to provide selected control signals, coupled to said PCMCIA interface circuit, said control

processor to provide selected control signals and to receive feedback signals to be provided to said host processor, and an external communication link; and a hearing-related analyzer coupled to said external communication link, said hearing-related analyzer including first circuits to provide selected testing signals to a patient in response to said selected control signals, and said audiometer including second circuits to receive feedback signals from the patient, said feedback signals to be passed over said external communication link to said control processor.

22. A portable hearing analyzer and hearing aid programming system, comprising:

a host including a processor, a first port operably connected to the processor, a second port operably connected to the processor, and a memory operably connected to the processor;  
a card connected to the first port of the host and wirelessly connected to a hearing aid, the card being an interface between the host and the hearing aid for programming the hearing aid; and  
a hearing analyzer connected to the second port of the host.

23. The system of claim 22, wherein the card is connected to the hearing aid by an infrared transmission system.

24. The system of claim 22, wherein the card is connected to the hearing aid by a radio frequency transmission system.

25. The system of claim 22, wherein the first port is externally accessible on the host, and the card is removably connected to the first port.

26. The system of claim 22, wherein the card includes a control processor and a memory system.

27. The system of claim 22, wherein the hearing analyzer includes a hearing analyzer card connected to the second port.

28. The system of claim 27, wherein the hearing analyzer includes a hearing analyzer circuit separate from the hearing analyzer card, and wherein the hearing analyzer circuit is in communication with the processor through the hearing analyzer card.

29. The system of claim 28, wherein the hearing analyzer includes a cable connection connecting the hearing analyzer card to the hearing analyzer circuit.

30. The system of claim 27, wherein the hearing analyzer includes a hearing analyzer circuit within the hearing analyzer card.

31. The system of claim 27, wherein the hearing analyzer card includes a processor system that produces hearing-related analyzing instructions; and wherein the hearing analyzer includes:

- 5       a plurality of selectable audio signal sources;
- a first circuit coupled to the plurality of selectable audio signal sources and coupled to the processor system of the hearing analyzer card to select one of the plurality of selectable audio signal
- 10       sources in response to predetermined ones of the hearing-related analyzing instructions.

32. The system of claim 31, wherein the hearing analyzer includes an audio signal device coupled to the first circuit

15       to apply the selected audio signals to a person whose hearing is to be tested.

33. A system of claim 32, wherein the hearing analyzer includes:

- 20       a feedback circuit having an input section to receive feedback signals and an output section; and
- a feedback control circuit coupled to the output section and coupled to processor system of the hearing analyzer to control transmission of the
- 25       feedback signals to the host processor.

34. The system of claim 33, and further including in

combination:

5        a feedback device coupled to the input section, the  
         feedback device including selection devices  
         operable to feedback hearing analysis signals  
         indicative of hearing responses resulting from the  
         selected ones of the selected audio signals.

10       35. The system of claim 27, wherein the hearing analyzer  
         card is a PCMCIA card.

         36. The system of claim 35, wherein the card that is  
         wirelessly connected to the hearing aid is a PCMCIA card.

15       37. The system of claim 22, wherein the card that is  
         wirelessly connected to the hearing aid is a PCMCIA card.